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Phil Isenberg, Chair
Delta Vision Blue Ribbon Task Force
428 J Street, Suite 440
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Dear Delta Vision Blue Ribbon Task Force Members:

I write on behalf of the CALFED Independent Science Board (ISB), to follow up on our recent letter to the Task Force commenting on the recently published PPIC report, "Envisioning Futures for the Sacramento-San Joaquin Delta". The purpose here is to elaborate on our concern that the analysis of alternatives in this outstanding work does not focus sufficiently on water quality issues.

Water quality is an essential indicator of the health of the Delta and the value of the water that is exported from the Delta. Water quality is also an essential Performance Measure for almost any engineering or management action that may be considered to rectify the Delta's problems. But quality is not an inherent property of water; its meaning depends on what use is to be made of the water. Source water for drinking, water for irrigation, and resident Delta water (called environmental water) may have similar or different measures of quality, depending on the destined use of the water or the contaminants involved. For example, pesticide residues are relevant to both ecosystem and public health, but not all pesticides are equally hazardous to all species.

Mercury transported into and through the Delta assisted by biological processes may affect the hatchability of fish eggs and through bioaccumulation end up in fish tissue where it becomes a hazard to human health if ingested. But mercury levels in Delta exports are seldom hazardous to humans *per se*. The standard for salinity may be met for agricultural and in-Delta purposes, but may be too high for drinking water sources because of excessive levels of bromide. Dissolved or suspended organic matter in the Delta may be a positive health factor for some species in the Delta ecosystem, but they are known to be the precursors of hazardous disinfection byproducts after the water is exported to a water utility and treated with chlorine. Some pharmaceuticals found in wastewater discharges that go into the Delta may be a hazard to some aquatic species but not to humans, or vice versa.

In short, water quality is important to the evaluation of Delta management alternatives, but the evaluation is a complex process that ideally should be specific about the contaminants being considered for risk assessments, be

based on quality assured monitoring data, and include some sort of conceptual or mechanistic model on how the contaminants affect the ecosystem or human health, and of course, on how the proposed management option will increase or reduce such risks. No doubt, the authors of *Envisioning Futures* did not have the time or resources to carry out these evaluations, but that does not detract from their importance as future alternatives are examined.

As you evaluate alternatives within the Delta Vision process in terms of their range of effects on water quality, we know that it may be difficult for you to find quality assured data, validated water quality models and expert risk evaluations for the contaminants of highest priority. If so, it may be necessary to use whatever data and models are available and the help of experts to make the most intelligent decisions about the alternatives you are considering.

As for prioritization of contaminants, please keep in mind that the *standards* for water quality are under continuous scrutiny by regulatory agencies and can be expected to change. Water quality criteria today may be different from those that are in effect in 20 years. This is almost always the result of research that is constantly examining water quality with sophisticated instruments that can detect chemical and biological contaminants with increasing sensitivity and specificity. These methods have repeatedly revealed water contaminants that were not previously observed and some that were added over time to the federal and state standards list.

Over the past 20 years, new discoveries have included:

- Compounds known to be endocrine disruptors that have been shown to affect reproductive outcomes and, in some cases to cause sex changes in test species such as fish.
- Residues of powerful drugs and personal care products – and their metabolites – that are apparently entering rivers with municipal or industrial wastewater.
- Newly discovered byproducts from the reaction of disinfectants (chlorine, ozone and chloramines used during water treatment) with ubiquitous natural “dissolved organic carbon”(DOC) that is in the waters feeding the Delta and also formed within the Delta. Some of these disinfection byproducts (DBPs) are members of chemical classes - such as brominated and iodinated acetic acids and acetonitriles, and nitrosoamines - known to have significant health effects on test species. Moreover, research has shown that DOC is different in different parts of a complex ecosystem, such as the Delta, so the range of DBPs produced will possibly change when water is exported from different locations in the Delta or its source waters. Moreover, DBP precursor levels are known to change when major real estate development occurs near a drinking water source.

When the section on water quality in the ROD was written, it was recognized that water quality standards would need to be continuously reevaluated. Unfortunately, two of the standards for exported water delineated in the ROD (3 mg/L DOC and 50 ug/L of bromide) have not been achieved on a regular basis, and few additional parameters have been added.

Finally, we should note that major environmental management decisions are often stimulated by “surprise” discoveries such as chlorination DBPs that were first found in the 1970’s. We now know that the number of DBPs is much larger than expected and those listed in the standards are almost surely not the most toxic. This and other factors demonstrate that the best single assurance of water quality for an externally influenced water system such as the Delta and its export conveyances is source water protection. It is true that modern technology can remove any contaminant from any water supply, but experience has shown again and again that the most cost and energy efficient alternative is to use a source water of the highest quality and to protect it against all sources of contamination. In the long term, this plus a multi-barrier treatment system, will assure water of the highest quality.

I look forward to meeting with you on April 27th and to answer your questions. In addition, the ISB trusts that you will continue to call on us as you proceed in your important work.

On behalf of the CALFED Independent Science Board,

William H. Glaze
Professor Emeritus, The University of North Carolina

cc: Delta Vision Blue Ribbon Task Force Members
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California Bay-Delta Authority Members
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